FIJI NATIONAL UNIVERSITY

COLLEGE OF AGRICULTURE, FISHERIES AND FORESTRY

SCHOOL OF AGRICULTURE

DEPARTMENT OF SOIL SCIENCE & AGRICULTURAL ENGINEERING

TRIMESTER3, 2017

FINAL EXAMINATION: 2017

Trade Diploma in Agriculture Year 1

SAC 402-Fundamentals of Soil Science

Total marks: 100 **Time allowed: 3:10 Hours**

This paper consists of nine (9) pages, please check to see that your paper is complete.

INSTRUCTIONS:-

Answer all questions in the answer booklet

- Number your answers correctly in the provided answer booklet.
- Write your student ID number on all pages including additional sheets.
- Write your student ID number on question paper.
- Don't write answers on question paper; write answers only in answer booklet.

"MOBILE PHONES ARE STRICTLY PROHIBITED IN THE EXAMINATION HALL"

Sections	Guidelines	Total Marks
A	Part I : Multiple Choice Questions (15marks) Part II: Matching (10 marks) Part III : True or False (15 marks) Part IV : Fill in blank (10 marks)	50
B	Short Answer Questions	30
C	Long Answers	20
	Total marks	**100**

SECTION A

PART I - MULTIPLE CHOICES [15 MARKS]

IN THE **ANSWER SHEET** PROVIDED, **CIRCLE** THE LETTER, WHICH REPRESENTS THE BEST ANSWER TO THE QUESTIONS BELOW.

1. One of the basic components of soil is:
   a) Mineral
   b) Organic matter
   c) Water
   d) All of the above
2. One function of soil in the ecosystem is:
   a) Habitat for soil organism
   b) Mineral matter
   c) Water
   d) Air
3. One of the major soil forming factors is:
   a) Valley
   b) Relief
   c) Mechanical
   d) Agriculture
4. One of the physical properties of soils is:
   a) Soil cultivation
   b) Soil development
   c) Soil horizon
   d) Soil porosity

5. One method of textural determination is:
    a) Test tube shaking method
    b) Decantation method
    c) Pipette method
    d) All of the above
6. One factor affecting soil structure is:
    a) Climate
    b) Organic matter
    c) Plant roots and residues
    d) All of the above
7. One factor influencing pore space is:
    a) Biological activity
    b) Vegetation
    c) Soil texture
    d) All of the above
8. One factor influencing soil colors is:
    a) Parent material
    b) Soil moisture
    c) Organic matter
    d) All of the above
9. A factor that affecting capillary water is:
    a) Surface tension
    b) hygroscopic water
    c) Available water
    d) Unavailable water
10. One of the factor that affect soil water availability is;
    a) Soil depth
    b) Organic matter

c) Soil compaction

d) All of the above

11. One advantages of watershed is:

a) Environmental friendly

b) Saves time and money

c) Greater peoples participation

d) All of the above

12. Purposes of rainwater harvesting and recharging?

a) Capturing sun from rooftops

b) Capturing soil from local catchments

c) Capturing seasonal floodwaters from local streams

d) Conserving water through hurricane

13. One of the soil conservation techniques is :

a) Contour

b) Gully control

c) Reclamation of alkaline soil

d) All of the above.

14. One characteristics of water shed is:

a) Climate

b) Sun

c) River

d) creek

15. Formation of a soil can be influenced by:

a) Organism

b) Caterpillar

c) Bad drainage

d) Good drainage

PART II – MATCHING [10 MARKS]

IN THE BOXES PROVIDED, WRITE THE LETTER OF THE STATEMENT IN LIST B THAT WOULD BEST MATCH THE WORDS IN LIST A.

	LIST A		LIST B
Q1	Particle size less than 0.002mm is called	A	time.
Q2	An oven dry weight of a unit volume of soil inclusive of pore spaces is called	B	a grade.
Q3	A very well formed peds is normally called	C	structure less.
Q4	What is a moderately well-developed peds	D	weak structure.
Q5	A poorly developed ped is called	E	moderate structure.
Q6	A pad withs no noticeable aggregation is called	F	Clay.
Q7	A degree of distinctness of peds is called	G	hygroscopic water .
Q8	Passive soil forming factors	H	available water.
Q9	Capillary water is, therefore, known as	I	bulk density.
Q10	The water that held tightly on the surface of soil colloidal particle.	J	strong structure.

PART III TRUE OR FALSE (15 MARKS)

In your answer booklet, write "**TRUE**" if the statement is **correct** and "**FALSE**" if it is **incorrect.**

1. When a balance of nutrient is not maintained in the soil problems will occur.
2. The soil profile is defined as a horizontal section of the soil that is exposed by a soil pit.
3. Loam and silt loam soil types are highly desirable for cultivation.
4. Sandy soils are good store house of plant nutrients.
5. The bulk density of a soil is always smaller than its particle density.
6. Soil temperature varies with different seasons of the year.
7. Soil water is the major component of the soil in relation to the plant growth.
8. Fine textured soils like clay contain more hygroscopic water than coarse textured soils.
9. Soil organic matter contains an estimated four times as much carbon as living plants.
10. Soils can become acidic as rainfall leaches nutrients away.
11. A soil profile is usually studied to a depth of 3 to 5 feet.
12. Gravitational water is of no use to plants because it occupies the larger pores, it reduces aeration in the soil.
13. Fertilizer like sodium nitrate destroys granulation by reducing the stability.
14. Organic matter helps increase air drainage.
15. Adding too much fresh organic matter can overstimulated soil microorganisms, which then consume so much nitrogen.

PART IV FILLS IN BLANK (10 MARKS)

In your answer booklet, write the correct word: "in the blank space provided"

1. _____is the process of evaporation of soil water a large amount of heat is used.
2. _____ the quantity of heat so absorbed by the soil that does not remain constant.
3. Water contained in soil is called soil _____
4. ----------is the amount of water held in the soil when all pores are filled.
5. ---------- water is held in the capillary pores
6. The inorganic materials obtained from soil which are used as raw material by plants are called mineral _____.
7. _____ solid substance whose particles are very small, but have very large surface area
8. In the soil colour _____denotes the dominant spectral colour
9. In the soil colour _____ denotes the intensity of colour
10. In the soil colour_____ indicates the purity of colour.

SECTION B

SHORT ANSWERS

[30 MARKS]

This section consists of THIRTY MARKS short answer questions.

Instructions:

Attempt ALL questions in this section.
Write your answers in the Answer Booklets provided

1. Briefly explain the following factors that affect soil temperature? (3marks)
   a) Slope of the land
   b) Vegetative cover

2. Briefly explain the following source of heat in the soil? (3 marks)
   a) Solar radiation
   b) Rain
3. Differentiate between the following biological classifications of soil water? (3 marks)
   a) Available water
   b) Unavailable water
   c) Super available water

4. Name the three (3) Nutrient elements obtained from atmosphere through photosynthesis and three (3) nutrient elements obtained from the soil. (3 marks)
5. Differentiate between water shed and watershed management? (4 marks)
6. Lists the four components of rain water harvesting? (2 marks)
7. Explain what is Cation Exchange capacity? (2 marks)
8. Briefly differentiate between : (3 marks)
   a) Macro – capillary pores -
   b) Micro – capillary pores
9. Briefly discuss the main reason for studying soil colors? **(3 marks)**

10. Briefly explain the following factors that are responsible for variation in the amount of capillary water. (4 marks)
    a) Surface tension
    b) Soil texture
    c) Soil structure

SECTION C

LONG ANSWERS

[20 MARKS]

Long answers type of questions.
Instruction:

1. ALL QUESTIONS ARE **COMPULSORY**
2. Write your answers in the **"Answer Booklet"** provided
3. **Start each question on a NEW page of your Answer Booklet.**

QUESTION 1
Briefly explain the following about organic matter: (10 marks)

a) What is organic matter?
b) Lists the six (6) importance of organic matter in the soil?
c) Explain the following main sources of organic matter in the soil?
   i. Crop residues
   ii. Green manure
   iii. Livestock manure

QUESTION 2
Briefly explain the following about soil erosion: (10 marks)

A) What is soil erosion?

B) How soil erosion happen?

C) Explain the four (4) types of soil erosion

D) How to control soil erosion?

END OF EXAMINATION PAPER